difference in the power of distinguishing colors. Philosophical investigations have been made by Sir David Brewster and Dr. Geo. Wilson of Edinburgh, and others, which have resulted in the discovery that a deficiency in the power to discern color is more prevalent than was supposed.

The name *color-blindness* has been given to this remarkable condition of sight. From calculations based on various examinations made in England and Scotland, it appears that one out of every fifteen is unable to distinguish all the ordinary colors; one in fifty-five confounds red with green; one in sixty brown with green; one in forty-six blue with green.

Of the three primary colors, *red* appears to be the most difficult to be distinguished; it is the distracting color of the three. Some persons cannot see it at all as a color, for it appears to them as black, but most commonly it is mistaken for green. Yellow is the color which least frequently escapes perception. There are but very few persons, even among those who are called color-blind, that do not see yellow perfectly. A pure blue is in the next degree least likely to be mistaken, and with some it is the most vivid color of the three.

When we combine the yellow and blue into a green, we have the greatest of all stumbling-blocks in color. Green is frequently mistaken for red, often for blue, by those who are color-blind. Those who cannot distinguish red regard purple as a blue; not perceiving the red in orange, that color is called a yellow.

Red and green are the two colors which are most commonly not distinguished, yet it so happens that these are the two colors used as signals on railroads and ships. This renders it most important that every person employed on railroads, whose position has any thing to do with signals, should be carefully tested as to his powers of distinguishing between the colors of red and green. A fearful catastrophe might occur from mistaking a signal implying danger for one denoting safety.

Bartholomew, the sculptor, could not distinguish between a crimson curtain and a green one. Yet he began his artistic career as a portrait painter, and once he gave the cheeks of a female sitter a hue of bright green. He put the two pigments upon his palette, and mistook the green for the red, and did not discover his mistake until it was pointed out to him. Yet, blind as he was to the difference of color, he had the most exquisite perception of the beauties of form.

The celebrated chemist, Dr. Dalton, thought the red gown in which he was installed as Doctor of Civil Law at Oxford was a blue one. Some of his friends, in order to test this peculiarity of his vision, substituted red stockings for those he usually wore. The doctor put them on without noticing any thing remarkable in their appearance, and when his attention was directed to them he only said they looked rather dirty.

How far this remarkable defect in distinguishing colors can be remedied by early training and careful education of the eye, it is impossible to answer from present experience; but we know that by cultivation the ear may be rendered much more capable of perceiving and distinguishing sounds. Judging then from analogy, we may reasonably suppose that the eye also, by proper training, might be greatly improved in its power of discriminating colors. At all events, it is of sufficient importance and probability to deserve greater attention, and to render it highly important that the subject of color should have a place in school training.

Preparations for Illustrating Color. — Before commencing exercises on color, the teacher should make herself familiar with the descriptions of color given under the following head:— "Classification, Combination, and Description of Colors;" also, as far as possible, with the colors themselves. A chart and box of colors, colors in worsted, pieces of ribbon, three good water-colors representing red, yellow and blue, colored crayons for the blackboard, a prism, wafers, colored paper, flowers, leaves, fruit, etc., etc., should be provided for illustrating these lessons.

If the teacher cannot easily obtain more suitable apparatus for illustrating the lessons on color, she might procure a sheet of perforated pasteboard, and work upon it squares, each about two inches in size, with colored worsteds, leaving a space of an inch between the different squares. In this manner all the colors might be represented very well. The following descriptions of them would aid in selecting the worsteds.

CLASSIFICATION, COMBINATION, AND DESCRIPTION OF COLORS.

All the colors exist between the extremes of light and darkness. These extremes are represented by *white* on one side and *black* on the other. Light is transparency, darkness is obscurity. From white we pass to *yellow*, which most nearly resembles light; thence to *red*, the representation of warmth and life, the most perfect color; thence to *blue*, which is related to shade or darkness, as yellow is to light, and finally ending in black.

In the rainbow are found the purest colors, and a key to the whole science of coloring. That is Nature's chart of colors, and is the only true standard for artists and colorists. Newton first discovered that the sunlight can be separated by the prism into the seven colors seen in the rainbow, red, orange, yellow, green, blue, indigo, purple. It has since been ascertained that four of these colors—*orange*, *green*, *purple*, and *indigo*—can be produced by mixing the other three, *red*, *yellow* and *blue*; but these three can not be obtained by any mixture of the other colors.

Red, *yellow* and *blue* are called the *primary colors*, because all the other colors, shades, hues and tints, from light to darkness, may be produced by the combination of these three in different proportions, with the aid of their extremes, white and black, as modifiers. The addition of black to a color gives shades; white gives tints.

If we could obtain perfectly pure red, yellow, and blue, of equal depth of color, and combine them in their proper proportions, they would produce white. However, artists have not been able to secure these colors in a sufficiently pure state to obtain white by their mixture. *Ultramarine* is the purest representative of a primary color known; its lightest and darkest shades are pure blue. No paint or coloring material of red or yellow has been produced without a slight mixture of one of the other colors. Even *carmine*, the purest type of the prismatic red that color-makers have produced, contains some yellow. The color obtained by the purest *chrome yellow*, or by gamboge, may be taken as the best representative of the prismatic yellow. Yet so far do these materials for red and yellow fall short of being perfect primary colors, that a mixture of the three representatives of the primary colors produces only a gray. However, for practical purposes, *carmine*, *chrome yellow*, and *ultramarine* may be taken for the standards of *red*, *yellow* and *blue*.

In the present state of our knowledge of color and light, it is difficult to answer satisfactorily the questions, "Why does grass appear green? Why are some apples red? Why do different things possess different colors?" It might be interesting at this point, to consider the wisdom of God in the beautiful and harmonious adaptation of colors in different objects; but it must suffice for the present to give the usual scientific answer—*all bodies absorb certain colors and reflect others*: thus, if the body is red, it absorbs the yellow and blue rays, and reflects the red; if yellow, it absorbs the red and blue rays, and reflects the yellow; if blue, it absorbs the red and yellow rays, and reflects the blue; if green, it absorbs the red rays, and reflects the yellow and blue; and so with the others: the colors which the body appears to possess are reflected, the others are absorbed.

CLASSIFICATION OF COLORS.

Primary Colors.—Red, yellow, blue.

A mixture of two primary colors produces a secondary color.

Secondary Colors.—Orange, green, purple.

A mixture of two secondary colors, or three primary ones in the proportion of two parts of one color and one part of each of the other two, produces a tertiary color.

Tertiary Colors.—Citrine, olive, russet.

The various combinations of the primary, secondary, and tertiary colors produce the

Irregular Colors.—Browns, maroon, claret, chocolate, auburn, chesnut, snuff, drab, gray, slate, &c.

Shade.—The graduation of a color or a hue in depth from its perfect state to a black, usually produced by the addition of black to a color.

Hue.—A hue is produced by combining two colors or hues in various unequal proportions, as a little yellow mixed with pure red gives a scarlet, a *hue* of red.

Tint.—The attenuation of a color or hue by mixing with it white.

Tinge.—A slight coloring or tincture distinct from the ground or principal color or hue.